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PATENT, TRADEMARK AND COPYRIGHT LAW
AND RELATED FEDERAL AND ITC LITIGATION

Docket: 0039-5461-2

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

Re: Serial No.: 08/578,980
Filed: DECEMBER 27, 1995
Applicant: TAKANOBU KAMAKURA
Title: SEMICONDUCTOR LIGHT EMITTING DEVICE

Attached hereto for filing are the following papers:

APPEAL BRIEF, APPENDIX I & II (in triplicate)

Our check in the amount of **$ 300.00** is attached covering any required fees. In the event any variance exists between the amount enclosed and the Patent Office charges for filing the above-noted documents, including any fees required under 37 C.F.R. 1.136 for any necessary Extension of Time to make the filing of the attached documents timely, please charge or credit the difference to our Deposit Account No. 15-0030. Further, if these papers are not considered timely filed, then a petition is hereby made under 37 C.F.R. 1.136 for the necessary extension of time. A duplicate of this sheet is enclosed.

Respectfully submitted,

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0039-5461-2

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF: :

TAKANOBU KAMAKURA : EXAMINER: WILLE

SERIAL NO: 08/578,980 :

FILED: DECEMBER 27, 1995 : GROUP ART UNIT: 2814

FOR: SEMICONDUCTOR LIGHT EMITTING DEVICE :

APPEAL BRIEF

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

SIR:

This is an appeal from the decision of the Examiner, dated July 24, 1998, which finally rejected Claims 1-10 of the above-identified application. A Notice of Appeal was timely filed on November 24, 1998. **Proposed Findings of Fact and Conclusions of Law are included as Appendix II herewith. See Gechter v. Davidson, 43 USPQ2d 1030 (Fed. Cir. 1997).**

I. REAL PARTY IN INTEREST

The real party in interest in the present appeal is the assignee of record, KABUSHIKI KAISHA TOSHIBA having a place of business at 72, Horikawa-cho, Saiwa-ku, Kawasaki-shi, Kanagawa-ken, Japan.

II. RELATED APPEALS AND INTERFERENCES

Appellants, Appellants' legal representative and the assignees are aware of no appeals which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

Claims 1-10 are pending in the present application on appeal. These claims stand finally rejected and the rejections of Claims 1-10 are herein appealed.

IV. STATUS OF AMENDMENTS

A Request for Reconsideration Under 37 CFR §1.116 was timely filed on October 26, 1998. In an Advisory Action dated November 6, 1998, the Examiner indicated that the Request had been considered but did not overcome the rejection. A Notice of Appeal was timely filed on November 24, 1998. The attached appendix reflects the claims as last amended on June 9, 1998. No amendments after final rejection have been filed or entered.

V. SUMMARY OF THE INVENTION

The present invention is directed to a dense defect layer having a defect density, a value of a lattice constant, and a thickness which are designed to protect a hetero-configuration from remote crystal defect migration. This layer is provided in a portion of a semiconductor light emitting device separated from the hetero-configuration having an active light emitting layer sandwiched between two clad layers so as to protect all of the layers of the hetero-configuration from secondary generated crystal defects. The basic structure of the

invention is illustrated, for example, in Figures 2 and 4b which show the hetero-configuration as a of lower clad layer 14, active light emitting layer 15, and an upper clad layer 16 separate from a dense defect layer 30. Page 6, lines 24-37 of the specification, for example, discuss the showing of Figure 1 while, for example, page 11, lines 1-5 describe how secondary crystal defects are prevented from migrating to the hetero-configuration of the active layer 15 sandwiched by the clad layers 14 and 16 as illustrated in Figure 4b. Accordingly, the dense defect layer advantageously safeguards all of the hetero-configuration layers from secondary crystal defects migrating or extending to these hetero-configuration layers after, for instance, heat processing associated with resin packaging of the semiconductor light emitting device induces crystal defects in surface regions and other regions external to the hetero-configuration layers. Note, for example, page 10, lines 4-14. Moreover, the need for the injection of defects into a material layer separate from the clad layers to form a dense defect layer is noted at page 11, lines 21-24, for example.

VI. ISSUES

The first issue for review is whether Claims 1, 3, and 5 are anticipated under 35 U.S.C. §102(b) by Scifres et al (U.S. Patent No. 4,984,242, hereinafter Scifres). A second issue for review is whether Claims 2 and 8 are unpatentable over Scifres in view of Inoue et al (U.S. Patent No. 5,019,874, hereinafter Inoue). A third issue for review is whether Claims 4 and 6 are unpatentable under 35 U.S.C. §103(a) over Scifres in view of Sugawara et al (U.S. Patent No. 5,153,889, hereinafter Sugawara). A fourth issue for review is whether Claim 5, 7, 9, and 10 are unpatentable under 35 U.S.C. §103(a) over Scifres in view of both Sugawara and Inoue.

VII. GROUPING OF CLAIMS

Claims 1 and 5, which stand rejected as being anticipated by Scifres, do not stand or fall together for the reasons noted below. Claim 3 is not separately argued.

Claims 2 and 8, which stand rejected as being obvious over Scifres in view of Inoue under 35 U.S.C. §103(a), do not stand or fall together for the reasons noted below.

Claims 4 and 6, which stand rejected under 35 U.S.C. §103(a) as being obvious over Scifres in view of Sugawara, stand or fall together for the reasons noted below.

Claims 5, 7, 9, and 10, which stand rejected as being obvious over Scifres in view of Sugawara and Inoue under 35 U.S.C. §103(a), do not stand or fall together for the reasons noted below.

VIII. ARGUMENT

FIRST ISSUE

1. ANTICIPATION REQUIREMENTS

It is well settled that before a *prima facie* case of anticipation can be established, it must be demonstrated that the prior art reference relied upon discloses, expressly, or under the doctrine of inherency, each and every element of the claimed invention as well as disclosing structure which is capable of performing all recited functional limitations. See RCA Corp. v. Applied Digital Data Systems, Inc., 221 USPQ 385, 388 (Fed. Cir. 1984). It is further well established that all claim limitations must be given effect, even functional ones. See In re Angstadt, 190 USPQ 214, 217 (CCPA 1976) and note MPEP §2173.05(g) ("A functional limitation must be evaluated and considered, just like any other limitation of the claim, for what it fairly conveys to a person of ordinary skill in the pertinent art in the context

in which it is used.").

2. All LIMITATIONS OF CLAIM 1 ARE NOT MET.

Turning to the outstanding rejection of Claims 1, 3, and 5 as being anticipated by Scifres, it is noted that base Claim 1 contains several limitations that Scifres cannot be said to reasonably meet. In this regard, Claim 1 requires that there must be "a first dense defect layer provided between the first electrode and the layers of the hetero-configuration" (emphasis added) with the first dense defect layer being made of a material described in Claim 1 as at least preventing "some of the crystal defects generated remotely from the layers of the hetero-configuration from reaching the layers of the hetero-configuration (emphasis added)." Claim 1 defines the hetero-configuration to be one "having an active layer that emits light when charge carriers are injected, a first clad layer, and a second clad layer, the active layer being interposed between the clad layers, the first and second clad layers each having an approximately equal thickness acting to keep the injected charge carriers in the active layer."

In the Amendment filed on June 9, 1998, these Claim 1 limitations that were believed to clearly define over the relied upon sowing of Fig. 2 of Scifres were emphasized as follows:

> Turning to the rejections of Claims 1-10 based upon the teachings and/or fair suggestions of Scifres, it is noted that independent Claims 1, 6, and 7 all require that there must be a "dense defect layer provided between the first electrode and the layers of the hetero-configuration" (emphasis added) with this dense defect layer being made of a material described in these independent claims as at least preventing "some of the crystal defects generated remotely from the layers of the hetero-configuration from reaching the layers of the hetero-configuration (emphasis added)." Thus, these independent claims require that all of the hetero-configuration layers must be separated from the first electrode by the dense defect layer so that it can function to prevent at least some remotely generated defects from reaching any of the layers of the hetero-configuration, not just the active layer as noted at page 3 of the present Action. Moreover, each of these independent claims require that the clad layers of the hetero-configuration must each have "approximately equal layer thickness" to function "to keep the injected charge carriers in the active layer."

> In sharp contrast, Scifres teaches that clad layer 25 of its hetero-configuration is provided with a strain inducing component to form strain layer 27 internally of clad layer 25. This is discussed at col. 4, lines 31-50 as to a "selected high concentration of indium" being added to the cladding layer 25 "to produce the strain layer 27." This is the changing of the "stoichiometry of the cladding layers" discussed at column 2, lines 47-55. Thus, contrary to Applicant's claimed subject matter and the disclosed advantages achieved thereby, Scifres teaches adding strain layer 27 inside of the cladding layer 25 which means a portion of cladding layer 25 cannot be protected by layer 27 as the claims all require. The result of placing layer 27 inside the cladding layer is clearly further inferior, as noted at page 11, lines 21-24 of the specification, for example, besides not being capable of performing the function claimed.
>
> Clearly, all of layer 25 is described by Scifres as a cladding layer. Such a cladding layer does not cease to become part of the hetero-configuration merely because indium has been added to a part thereof to create a strain field relative to the small modified portion 27 which is still internal to the overall cladding layer.

Applicants believed that they had clearly indicated that while the description of Fig. 2 of Scifres teaches providing a particular type of strain layer 27 to protect the active region of the Scifres hetero-configuration, the positioning of this strain layer 27 within the cladding layer 25 meant that it was impossible for strain layer 27 to be interpreted as being "between the first electrode and the layers of the hetero-configuration" as Claim 1 specifies or to further function in the manner specified by Claim 1. Clearly, the Amendment was not suggesting that strain layer 27 was not a separate layer as paragraph 20 on page 5 of the final rejection states. Instead, the position of strain layer 27 inside the cladding layer 25 was emphasized in terms of the resulting impossibility of strain layer 27 being reasonably interpreted to be between the first electrode and this cladding layer of the hetero-configuration as well as the fact that strain layer 27 could not function to protect the portion of cladding layer 25 between it and 23, for example, from being impacted by defect migration.

These differences and the fact that Claim 1 does not simply recite that the first defect layer is to protect just the active layer portion of the hetero-configuration were the intended

emphasis. This emphasis notwithstanding, the final rejection continued to incorrectly interpret Claim 1 as only requiring that the first dense defect layer prevents defect migrations from reaching the active layer (note paragraph 3 on page 2 of the final rejection again emphasizing that strain layer 27 is used "to prevent defect migration to the active region"), instead of the actual Claim 1 recital of "from reaching the layers of the hetero-configuration" which were earlier recited as "an active layer ... , a first clad layer, and a second clad layer."

Accordingly, since Scifres discloses no structure having a first dense defect layer in the position specified by Claim 1 and capable of performing the Claim 1 recited functional limitation (see again In re Angstadt, supra and RCA Corp. v. Applied Digital Data Systems, Inc., supra) of preventing "at least some of the crystal defects generated remotely from the layers of the hetero-configuration from reaching the layers of the hetero-configuration," Scifres cannot be reasonably said to anticipate Claim 1.

Also missing from Scifres is any hint that the addition of indium into the cladding layer is done in a manner to provide the Claim 1 "material having a concentration of crystal defects, a value of lattice constant, and a thickness" that cooperate to "together prevent at least some of the crystal defects ... from reaching the layers of the hetero-configuration." While col. 4, lines 43-50 discuss thin strain layers 27 that are on the order of 10 nm thick with a lattice mismatch of not more than about 4%, these values are indicated to prevent strain layer 27 from cracking and not to cooperate with any unknown concentration of crystal defects to somehow "together" cooperate to block crystal defect migration.

3. UNREASONABLE INTERPRETATION OF WHAT CONSTITUTES A CLAD LAYER.

As noted on pages 6-7 of the Brief filed December 15, 1997, the record reflects an unreasonable interpretation by the Examiner that:

> [T]he portion of 25 between the strain layer 27 and the active layer 29 could still be read as a clad layer of the hetero-configuration and that, apparently, the portion of 25 separated by layer 27 from the remaining portion of 25 need not be considered as a part of the layers of the hetero-configuration. Applicant believes that this interpretation is unreasonable and not consistent with the usual meaning of a clad or cladding layer to the artisan, much less with the usage of these and related terms in the specification.
>
> Clearly, all of layer 25 is described by Scifres as a cladding layer. Such a cladding layer does not cease to become part of the hetero-configuration merely because indium has been added to a part thereof to create a strain field relative to the small modified portion 27 which is still internal to the overall cladding layer. The rule is well established that "claims are not to be read in a vacuum, and limitations therein are to be interpreted in light of the specification in giving them their "broadest *reasonable* interpretation" (In re Okuzawa, 190 USPQ 464 (CCPA 1976) citing In re Royka, 180 USPQ 580 (CCPA 1974)). Clearly. the reading offered in support of the rejection is not a "reasonable" interpretation in light of the specification, much less is it consistent with what Claim 1 states and what has been disclosed in terms of what constitutes a "hetero-configuration" and a "clad layer." Note also In re Sneed, 218 USPQ 385, 388 (Fed. Cir. 1983) which emphasizes that the bounds of reasonableness are set by the specification as it would be interpreted by those of ordinary skill in the art.
>
> Consequently, the interpretation being offered is unreasonable because it ignores both what Claim 1 and the specification indicate in terms of what reasonably constitutes a "hetero-configuration" and a "clad layer." In this regard, Applicants usage of these terms in the specification must be considered, note Royka at 180 USPQ 582-83.

Although the final rejection does not expressly state that this reading of only the portion of 25 between 27 and 29 of Scifres as one of the recited clad layers has been adopted, the statements made at the end of paragraph 20 on page 5 of the final rejection appear to suggest this is the case. The final statement that "Scifres et al. show the claimed structure regardless of what is in the specification" appears to reflect that the court established guidelines as to interpreting the meaning of claim limitations in light of the specification is either being ignored by the examiner or not understood. If it is simply being ignored because of the mistaken belief that the PTO need not interpret claim limitations in light of the disclosure, the recent statement to the contrary by the Federal Circuit in In re Morris, 44

USPQ2d 1023, 1027 (1997) demonstrates the clear error in such a position in noting that "it would be unreasonable for the PTO to ignore any interpretive guidance afforded by applicant's written description."

In any event, it is believed that the artisan would have understood that the layer 25 into which indium is added to form strain layer 27 is first and foremost to function as a clad layer. There is nothing in Scifres which reasonably points to the part of 25 that is separated from layer 29 by strain layer 27 as ceasing to be a part of the clad layer and performing some other function. Clearly, col. 4, lines 13-30 treats 25 as an entity and refers to it as "a cladding layer 25." This was more fully discussed at page 4 of the Request for Reconsideration filed October 26, 1998, which notes that:

> Here the question not answered in the Office Action is if all of layer 25 is not a cladding layer, then what function or purpose does that part of 25 which is separated from the active layer 29 by the strain layer 27 serve? Thus, is the PTO suggesting that Scifres teaches that the exterior portion of layer 25 has ceased to function as part of the cladding layer and takes on some other function or purpose. Applicant has carefully scrutinized the reference and can find no such teaching or suggestion therein. However, since the Patent Office's position seems to be that the exterior portion of layer 25 is no longer part of the hetero-configuration (in terms of being part of the cladding layer), it appears that the Patent Office should have no problem explaining how the reference teaches this portion of 25 to perform some other function. In providing such an explanation, it is believed that the Patent Office will also have no problem pointing to the specific portions of the reference supporting its position. See In re Rijckaert, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) which indicates that "when the PTO asserts that there is an explicit or implicit teaching or suggestion in the prior art, it must indicate where such a teaching or suggestion appears in the reference." Moreover, the position of Scifres being relied upon to teach or suggest some purpose as to the part of layer 25 separated from 29 by 27 is believed to be particularly relevant given that Scifres repeatedly refers to the strain layer 27 as being within the cladding layer 25. Note, for example, column 3, lines 12 and 13, column 4, lines 31 and 32, and column 2, lines 42-44. Note also that Scifres defines his heterostructure in terms of reference number 41 in Figure 3 which is shown as including the cladding layers, strain layers and the active layer.

Instead of addressing these points, the examiner appears content to continue to rely upon the roosed reading of only art of the overall cladding layer as the cladding layer resulting in an unwarranted "conjectural modification"of the type noted to be improper in Carl Schenck, A.G.v. Nortron Corp., 218 USPQ 698, 702 (Fed. Cir. 1983).

In addition, the Amendment filed on June 9, 1998 emphasized that Claim 1 required that each of the two clad layers of the hetero-configuration were to have "an approximately equal layer thickness acting to keep the injected charge carriers in the active layer"and that:

> [I]t is clear that Scifres contemplates the use of cladding layers having typical thicknesses of 1 μm as disclosed at col.3, lines 55 and 56. On the other hand, col. 5, lines 16-20 note that strain layer 27 is typically at least 0.5 μm away from the active layer region 29. Accordingly, the Scifres layer portions 25 divided by layer 27 are not each separately capable of performing the cladding layer function and they would not be each provided with the same thickness of cladding layer 31, unless that layer was being implemented with only half of its typical thickness, an unreasonable presumption.

Paragraph 21 of the final rejection (bridging pages 5 and 6) appears to interpret the diagramatic showing of the two halves of layer 25 as each being the same thickness as layer 31. The Request for Reconsideration filed on October 26, 1998, pointed out that the apparent reliance upon the showing of any figure as reflecting actual scale was flawed because:

> [I]t is well established that diagrammatic showings of patent drawings which are not stated to be scale cannot be relied upon to reflect relative measurements. Note In re Chitawat, 161 USPQ 224, 226 (CCPA 1969) and In re Wright, 193 USPQ 332, 335 (CCPA 1977). In addition, note In re Turlay, 134 USPQ 355, 360 (CCPA 1962) setting forth that it is "well established that an anticipation rejection cannot be predicated on an ambiguous reference." This decision is particularly relevant given that the PTO there also attempted to improperly rely upon a showing of the reference patent (Fig. 1) without taking into consideration the inconsistent description of the specification. The Court rejected such an approach and found the overall description in light of both the words and the showing to be ambiguous and thus, the lack of a proper reference to rely upon under 35 U.S.C. §102. Since, at the very least, the situation here is the same in terms of the ambiguities present based upon a

comparison of the figures to each other much less the figures to the description in the specification of the reference, it is submitted that no anticipation has been reasonably shown here.

Turning to paragraph 21 of the Action, it is clear that the statement that "Figure 2 shows the clad layers 25 and 31 as having the same thickness" is in error because it ignores the full extent of 25 illustrated in Figure 2, where this layer 25 appears on both sides of 27. This approach of ignoring the clear teachings of Scifres in terms of the indium being injected into the layer 25 to create internal layer 27 has been used throughout the action, as noted above, and cannot establish anticipation.

Consequently, the strained reading of only part of layer 25 as one of the disclosed cladding layers of the Scifres hetero-configuration is clearly unreasonable just as it is unreasonable to presume that each one of the two illustrated parts of the complete cladding layer 25 is actually being taught to be the same thickness as cladding layer 31 because of the diagramatic showing of Fig. 2. Moreover, even if such unreasonable interpretations were found to be reasonable, the fact remains that Scifres is missing the above-noted teaching that the addition of indium into the cladding layer is done in a manner to provide the Claim 1 "material having a concentration of crystal defects, a value of lattice constant, and a thickness" that cooperate to "together prevent at least some of the crystal defects ... from reaching the layers of the hetero-configuration."

Accordingly, the rejection of Claims 1 and 3 as being anticipated by Scifres is clearly erroneous and should be reversed as relying upon an unreasonable interpretation of the fair and reasonable teachings of Scifres and, thus, failing to establish the required *prima facie* showing of anticipation.

4. CLAIM 5 ARGUMENT.

In addition to the above, Claim 5 adds a buffer layer that must function to "help impede remotely generated crystal defects from reaching the active layer." The only discussion of a buffer layer in Scifres is the passing mention of a graded buffer layer not

shown but discussed as to Fig. 1 at col. 3, lines 36-38. However, the material or function of such a graded buffer layer are not taught and it is pure conjecture to assume such a "graded buffer layer" will automatically have the capability of meeting then claim 5 function noted above. Again, without a clear indication that every conceivable graded buffer layer will possess this capability, an anticipation rejection is inappropriate under the dictates of the above-noted case law.

SECOND ISSUE

Claims 2 and 8 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Scifres in view of Inoue. This rejection is clearly in error because the artisan would have had no reason to believe that anything from Inoue's cures the deficiencies noted above as to Scifres. In addition, the final rejection fails to present any reasonable motivation which would have led the artisan to combine these two references relative to Claim 2 subject matter or that of Claims 8, much less to reasonably expect that a combination of two such dissimilar teachings would be successful.

1. CLAIM 2 ARGUMENTS.

Claim 2 clearly requires that "a second dense defect layer" be provided at a specific location and of a "material having a concentration of crystal defects, a value of lattice constant, and a thickness" that cooperate to "together prevent at least some of the crystal defects ... from reaching the layers of the hetero-configuration." The final rejection first incorrectly presumes that the graded buffer layer discussed above is somehow known to block defects. From this unsubstantiated and conjectural presumption the action then presumes that something undefined in the Scifres discussion of other strain layers in other cladding layers is some how compatible the Inoue teachings. However this is not the case as

was pointed out in the Amendment filed June 9, 1998, as follows:

> In this last regard, the present Office Action suggests that Inoue teaches the use of multiple defect regions to limit defect migration relative to the Abstract. However, this is a clearly oversimplified and misleading statement that fails to take the teachings of the Abstract in context, much less demonstrating the required consideration of the reference teachings as established by the courts. Note In re Wesslau, 147 USPQ 391, 393 (CCPA 1965) which establishes it to be clear error "to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art."
>
> In order to fully appreciate the teachings of Inoue, it is necessary to consider its concern with providing semiconductor devices including epitaxial layers provided on substrates of different semiconductor materials. In this regard, the problem noted by Inoue is that an epitaxial layer of a compound semiconductor (such as gallium arsenide (GaAs)) which is grown on a silicon (Si) wafer contains a substantial amount of dislocations because of the differences in lattice constant and coefficients of thermal expansion between GaAs and Si. Note column 1, lines 41-47. This results in what is called a slip or misfit in the crystal lattice of Si and GaAs at the heterojunction interface which propagates into the epitaxial layer as dislocations. See column 1, lines 47-53. Inoue resorts to creating canceling dislocations in order to correct the problem as discussed at column 2, lines 47-67. This use of multiple defect regions to limit defect migration by cancellation is entirely different than the attempted blocking of defects with the induced strain layer of Scifres.. The Office Action would erroneously lift the "preventing a first group of dislocations created in the third semiconductor layer from reaching the second semiconductor layer" of the Abstract of Inoue totally out of this cancellation prevention context and into the completely foreign territory of strain layer defect migration blocking taught by Scifres. However, the present Office Action presents no convincing reasoning or rationale which is based upon logic as to why such divergent approaches would have led the artisan to modify Scifres so as to "include a second strain layer to supplement the buffer region" as noted on page 3 of the present Office Action. The requirement for a "logical reason apparent from positive , concrete evidence of record" is well established. See In re Regel, 188 USPQ 136, 139, n. 5 (CCPA 1975).
>
> Moreover, since Fig. 3 of Scifres already includes two strain layers 47 and 49 in clad layers on either side of the active region, the required showing of a logical reason why these layers on either side of the active layer would be abandoned is doubly lacking. The logic of eliminating layers 47 and 49 which are said to improve performance (col. 5, lines 35-38) and then adding layers to somehow supplement this lost performance does not appear to be logical.

Accordingly, clear error is again believed to be present.

In any event, it is unclear where the alleged benefit at the top of page 3 of the final rejection ("supplement the buffer region") is taught by Inoue and this rejection thus fails the burden placed on the PTO by In re Rijckaert, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) ("when the PTO asserts that there is an explicit or implicit teaching in the prior art, it must indicate where such a teaching or suggestion appears in the reference" (citation omitted)).

In terms of motivation, the Inoue teachings relate to creating canceling dislocations in order to correct the problem as discussed above and at column 2, lines 47-67. This use of multiple defect regions to limit defect migration by cancellation is entirely different than the attempted blocking of defects with the induced strain layer of Scifres. The final rejection presents no convincing reasoning or rationale as to why such divergent approaches would have led the artisan to "include a second strain layer as taught by Inoue et al. to supplement the buffer region" as noted on page 3 of the final rejection, much less does the mixing of these two entirely opposite approaches appear to have any reasonable chance for success. It is well established that in order to have a valid *prima facie* case of obviousness, there must be a reasonable expectation of success arising from the teachings of the prior art. See MPEP §2143.02.

2. CLAIM 8 ARGUMENTS.

In addition to what was noted above as to Inoue 's actual teachings, the apparent reliance in the final rejection upon "dislocation density," which relates to the density of the misfits or dislocations being propagated, in terms of teaching the claimed concentration of crystal defects induced into the dense defect layer of Claim 8 is further clear error. These diifferent densities are taught to be for obtaining opposite effects and there would be no

reasonable basis to attempt to combine them, much less any reasonable expectation of success. Accordingly, it is clear that the crystal defect limitation of Claim 8 is not rendered obvious by the disparate defect cancellation teachings of Inoue and the totally inconsistent defect blocking structures and teachings of Scifres.

3. ARGUMENTS FOR CLAIMS 2 AND 8.

Clearly, the establishment of a *prima facie* case of obviousness requires a showing of some objective teaching or generally available knowledge that would have led one of ordinary skill in the art to combine the referenced teachings in the exact manner to obtain the subject matter of Claims 2, and 8-10. Note In re Fine, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). Moreover, the Fine decision emphasizes (at page 1600) that the purposes behind the teachings being said to be combined must be considered and where these purposes are entirely unrelated, a combination of such reference teachings is not reasonably taught. In addition, this decision notes that it is "error to find obviousness where references 'diverge from and teach away from the invention at hand'" (at page 1599). Not only are the teachings of Scifres inconsistent with the claimed invention, the teachings of Inoue are inconsistent therewith as well as being inconsistent with those of Scifres. Clearly, the 35 U.S.C. §103 rejection offered based upon these references as evidence of obviousness is misplaced. Accordingly, it is believed that this rejection should also be reversed.

THIRD ISSUE

Claims 4 and 6 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Scifres in view of Sugawara asserting that Sugawara teaches "a current spreading layer 15 (cover Figure) and detail the use of a buffer layer 32 (Fig. 6)." However, the rejection references a more uniform output that appears to relate to spreading and improved reliability

that seems to relate to neither teaching. Once again, it would appear that the examiner should have no problem pointing to specific portions of Sugawara that teach how these elements to improve reliability. See In re Rijckaert, supra. It appears that the Examiner is merely asserting that since current spreading layers and buffer layers were known, the use of such layers is obvious per se. No case law is cited as authority.

FOURTH ISSUE

Claims 5, 7, 9, and 10 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Scifres in view of Sugawara and Inoue. This rejection is flawed because the teachings relied upon from Inoue are clearly not combinable with either those of Scifres or Sugawara.

Claim 5 is treated above.

Claim 7 requires a second dense defect layer of the nature of Claim 2. The arguments made above as to Claim 2 thus apply also to Claim 7.

Claims 9 and 10 are similar to Claim 8 in requiring concentration of crystal defects of $10^4/cm^2$ which is not taught by any of these references, as noted above. In addition, Claim 6 arguments made above apply to Claim 9 and those of Claim 7 apply to Claim 10.

SUMMARY

The Examiner's position as to Scifres, which is used in all of the prior art rejections, is rooted in the misconception that the Patent Office is privileged to ignore the requirement for reasonableness when it interprets the claim limitations as well as what Scifres teaches. However, as set forth above, such a position is clearly at odds with established case law which requires that the claim terms must be reasonably interpreted in light of the usage of those terms in the specification.

Moreover, no matter what ground of rejection is offered, the PTO has the burden of establishing a *prima facie* case relative thereto. It is clear that no such *prima facie* case has been established relative to any of the rejections offered here.

In the final analysis, the Examiner has failed to set forth any rejection which meets well established court standards as to demonstrating anticipation or obviousness. Accordingly, the decision of the Examiner should be reversed.

Applicants therefore believe that the final rejection of the claims is improper and respectfully request the reversal of all grounds of rejection.

Respectfully submitted,

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APPENDIX I

CLAIMS ON APPEAL

1. A semiconductor light emitting device comprising:

a hetero-configuration having an active layer that emits light when charge carriers are injected, a first clad layer, and a second clad layer, the active layer being interposed between the clad layers, the first and second clad layers each having an approximately equal layer thickness acting to keep the injected charge carriers in the active layer;

a first and a second electrode, the layers of the hetero-configuration being interposed between the electrodes; and

a first dense defect layer provided between the first electrode and the layers of the hetero-configuration, the first dense defect layer being made of a material having a concentration of crystal defects, a value of a lattice constant, and a thickness which together prevent at least some of the crystal defects generated remotely from the layers of the hetero-configuration from reaching the layers of the hetero-configuration.

2. The device according to Claim 1, further comprising a second dense defect layer provided between the second electrode and the layers of the hetero-configuration, the second dense defect layer being made of a material having a concentration of crystal defects, a value of a lattice constant, and a thickness which together prevent at least some of the crystal defects generated remotely from the layers of the hetero-configuration from reaching the layers of the hetero-configuration.

3. The device according to Claim 1, wherein the hetero-configuration is a double hetero-configuration in which the active layer is undoped, and the first and second clad layers are doped for a specific conductivity type.

4. The device according to Claim 1, further comprising a current diffusion layer, provided between the first electrode and the first dense defect layer, the current diffusion layer diffusing current applied through the first electrode.

5. The device according to Claim 1, further comprising a semiconductor substrate provided between the second electrode and the layers of the hetero-configuration and a buffer layer provided on the semiconductor substrate, said buffer layer helping to impede remotely generated crystal defects from reaching the active layer.

6. A semiconductor light emitting device comprising:

a hetero-configuration having an active layer that emits light when charge carriers are injected, a first clad layer, and a second clad layer, the active layer being interposed between the clad layers, the first and second clad layers each having an approximately equal layer thickness acting to keep the injected charge carriers in the active layer;

a first and a second electrode, the layers of the hetero-configuration being interposed between the electrodes;

a dense defect layer provided between the first electrode and the layers of the hetero-configuration, the dense defect layer being made of a material having a concentration of crystal defects, a value of a lattice constant and a thickness which together prevent at least some of the crystal defects generated remotely from the layers of the hetero-configuration from reaching the layers of the hetero-configuration;

a current diffusion layer provided between the first electrode and the dense defect layer, the current diffusion layer diffusing current applied through the first electrode;

a contact layer provided between the first electrode and the current diffusion layer, the contact layer making ohmic contact between the first electrode and the current diffusion layer;

a semiconductor substrate provided between the second electrode and the layers of the hetero-configuration;

a buffer layer provided on the semiconductor substrate, the buffer layer helping to impede remotely generated crystal defects from reaching the active layer; and

a reflective layer provided on the buffer layer, the reflective layer reflecting light emitted by the active layer so that the emitted light does not enter the buffer layer and the semiconductor substrate.

7. (Amended) A semiconductor light emitting device comprising:

a hetero-configuration having an active layer that emits light when charge carriers are injected, a first clad layer and a second clad layer, the active layer being interposed between the clad layers, the first and second clad layers each having an approximately equal layer thickness acting to keep the injected charge carriers in the active layer;

a first and a second electrode, the layers of the hetero-configuration being interposed between the electrodes;

a first dense defect layer provided between the first electrode and the layers of the hetero-configuration, the first dense defect layer being made of a material having a concentration of crystal defects, a value of a lattice constant and a thickness which together prevent at least some of the crystal defects generated remotely from the layers of the hetero-configuration from reaching the layers of the hetero-configuration;

a current diffusion layer provided between the first electrode and the first dense defect layer, the current diffusion layer diffusing current applied through the first electrode;

a contact layer provided between the first electrode and the current diffusion layer, the contact layer making ohmic contact between the first electrode and the current diffusion layer;

a second dense defect layer provided between the second electrode and the layers of the hetero-configuration, the second dense defect layer being made of a material having a concentration of crystal defects, a value of a lattice constant and a thickness which together prevent at least some of the crystal defects generated remotely from the layers of the hetero-configuration from reaching the layers of the hetero-configuration; and

a buffer layer provided on the second electrode, the buffer layer helping to impede remotely generated crystal defects from reaching the active layer.

8. The device according to Claim 1, wherein the concentration of crystal defects is $10^4/cm^2$ or greater and the thickness of the first dense layer is 10nm or greater.

9. The device according to Claim 6, wherein the minimum concentration of crystal defects is $10^4/cm^2$ or greater and the thickness of the dense defect layer is 10nm or greater.

10. The device according to Claim 7, wherein both of the minimum concentrations of crystal defects are $10^4/cm^2$ or greater and the thickness of the first and the second dense defect layers is 10nm or greater.

APPENDIX II

PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW

A. Findings of Fact

1. Scifres teaches that clad layer 25 of its hetero-configuration is provided with a strain inducing component to form strain layer 27 internally of clad layer 25 (at col. 4, lines 31-50) as to a "selected high concentration of indium" being added to the cladding layer 25 "to produce the strain layer 27."

2. Scifres teaches the use of cladding layers having typical thicknesses of 1 μm at col. 3, lines 55 and 56. On the other hand, col. 5, lines 16-20 note that strain layer 27 is typically at least 0.5 μm away from the active layer region 29. Accordingly, the Scifres layer portions 25 divided by layer 27 are not disclosed to each be separately capable of performing the cladding layer function and they would not be each provided with the same thickness as cladding layer 31, unless that layer was being implemented with only half of its typical thickness, which is an unreasonable presumption.

3. Both illustrated layer portions 25 in Fig. 2 of Scifres are the cladding layer and layer 27 can block no defects from reaching the outer portion of this combined cladding layer.

4. There is no teaching in Scifres that the addition of indium into the cladding layer is done in a manner to provide "material having a concentration of crystal defects, a value of lattice constant, and a thickness" that cooperate to "together prevent at least some of the crystal defects... from reaching the layers of the hetero-configuration."

5. Scifres cannot be said to anticipate Claims 1, 3, and 5 because it does not teach all of the limitations of these claims in the manner required by the below noted law.

6. Inoue teaches a problem in that include semiconductor devices epitaxial layers

provided on substrates of different semiconductor materials. The problem is that an epitaxial layer of a compound semiconductor (such as gallium arsenide (GaAs)) which is grown on a silicon (Si) wafer contains a substantial amount of dislocations because of the differences in lattice constant and coefficients of thermal expansion between GaAs and Si. See column 1, lines 41-47. This results in what is called a slip or misfit in the crystal lattice of Si and GaAs at the heterojunction interface which propagates into the epitaxial layer is dislocations. See column 1, lines 47-53. Inoue teaches creating canceling dislocations in order to correct the problem as discussed at column 2, lines 47-67. This use of multiple defect regions to limit defect migration by cancellation is different than the blocking of defects with the induced strain layer of Scifres.

Conclusions of Law

1. It is well settled that before a prima facie case of anticipation can be established, it must be demonstrated that the prior art reference relied upon disclosed, expressly, or under the doctrine of inherency, each and every element of the claimed invention as well as disclosing structure which is capable of performing all recited functional limitations. See RCA Corp. V. Applied Digital Data Systems, Inc., 221 USPQ 385, 388 (Fed. Cir. 1984). It is further well established that all claim limitations must be given effect, even functional ones. See In re Angstadt, 190 USPQ 214, 217 (CCPA 1976) and note MPEP §2173.06(g) ("A functional limitation must be evaluated and considered, just like any other limitation of the claim, for what it fairly conveys to a person of ordinary skill in the pertinent art in the context in which it is well used.").

2. The rule is well established that "claims are not to be read in a vacuum, and limitations therein are to be interpreted in light of the specification in giving them their "broadest *reasonable* interpretation" (In re Okuzawa, 190 USPQ 464 (CCPA 1976) citing In re Royka, 180

USPQ 580 (CCPA 1974)). Note also In re Sneed, 218 USPQ 385, 388 (Fed. Cir. 1983) and In re Morris, 44 USPQ 2d 1023, 1027 (Fed. Cir. 1997).

3. In re Rijckaert, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) requires that "when the PTO asserts that there is an explicit or implicit teaching or suggestion in the prior art, it must indicate where such a teaching or suggestion appears in the reference."

4. Conjectural reference modification are not permitted. See Carl Schenck, A.G. v. Norton Corp., 218 USPQ 698, 702 (Fed. Cir. 1983).

5. It is well established that diagrammatic showings of patent drawings which are not stated to be scale cannot be relied upon to reflect relative measurements. Note In re Chitawat, 161 USPQ 224, 226 (CCPA 1969) and in re Wright, 193 USPQ 332, 335 (CCPA 1977). In addition, note In re Turlay, 134 USPQ 355, 360 (CCPA 1962) setting forth that it is "well established that an anticipation rejection cannot be predicated on an ambiguous reference."

6. All 35 U.S.C. §103 rejections must be supported by a "logical reason apparent from positive, concrete evidence of record." See In re Regel, 188 USPQ 136, 139, n. 5 (CCPA 1975).

7. It is clear error "to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." In re Wesslau, 147 USPQ 391, 393 (CCPA 1965).

8. The establishment of *prima facie* case of obviousness requires a showing of some objective teaching or generally available knowledge that would have led one of ordinary skill in the art to combine the referenced teachings in the exact manner to obtain the subject matter claimed. Note In re Fine, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Moreover, Fine emphasizes (at page 1600) that the purposes behind the teachings being said to be combined must be

considered and where these purposes are entirely unrelated, a combination of such reference teachings is not reasonably taught.

9. Since obviousness in a §103 sense has not been established as to the subject matter of Claims 2 and 4-10, the rejection of the claims based upon 35 U.S.C. §103 must be reversed.